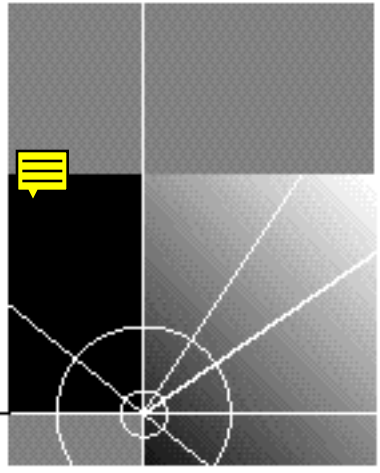
CoreBuilder™ 5000 Ethernet 24-Port 10BASE-T Module User Guide



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How to Use This Guide

This guide explains how to install and operate the 3Com CoreBuilder™ 5000 Ethernet 24-Port 10BASE-T Module (referenced throughout this guide as 24-Port module). It also includes information on monitoring this module using a 3Com® CoreBuilder 5000 Distributed Management Module. Appendix A provides information on cabling guidelines and options for this module.

Audience

This guide is intended for the following people at your site:

- Network manager or administrator
- Hardware installer

Structure of This Guide

This guide contains the following chapters:

Chapter 1, Introduction – Introduces the functions and features of the CoreBuilder 5000 Ethernet 24-Port 10BASE-T Module.

Chapter 2, Designing and Expanding the Network – Shows possible network configurations using the CoreBuilder 5000 hub and the CoreBuilder 5000 Ethernet 24-Port Module.

Chapter 3, Installing and Operating the Module – Provides illustrated procedures for installing the 24-Port module into the CoreBuilder 5000 hub. Also shows front panel LEDs and dip switches on the module and describes network management commands.

Chapter 4, Troubleshooting – Provides help in isolating and correcting problems that may arise when installing or operating this module.

Appendix A, Specifications – Provides electrical, environmental, and mechanical specifications for the module. In addition, this appendix provides information on 50-pin Telco-type connectors, RJ-45 connectors, and twisted pair cables.

Appendix B, Technical Support – Lists the various methods for contacting the 3Com technical support organization and for accessing other product support services.

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Document Conventions

The following document conventions are used in this manual:

Convention	Indicates	Example
Courier text	User input	In the Agent Information Form, enter `MIS` in the New Contact field.
	System output	After pressing the Apply button, the system displays the message `Transmitting data`.
Bold command string	Path names	Before you begin, read the readme.txt file located in **`/usr/snm/agents.`**
Italic text in braces	User-substituted identifiers	Use the following command to show port details: `SHOW PORT {`*`slot`*`.all} VERBOSE`
Capitalized text in plain brackets	Keyboard entry by the user	Type your password and press [ENTER].
Italics	Text emphasis, document titles	Ensure that you press the Apply button *after* you add the new search parameters.

Icon	Notice Type	Alerts you to...
	Information note	Important features or instructions
	Caution	Risk of personal safety, system damage, or loss of data
	Warning	Risk of severe personal injury

Related Documents

This section provides information on supporting documentation, including:

- 3Com Documents
- Reference Documents

3Com Documents

The following documents provide additional information on 3Com products:

CoreBuilder 5000 *Integrated System Hub Installation and Operation Guide* – Provides information on the installation, operation, and configuration of the CoreBuilder 5000 Integrated System Hub. This guide also describes the principal features of the CoreBuilder 5000 Fault-Tolerant Controller Module.

Distributed Management Module User Guide – Provides information on the CoreBuilder 5000 Distributed Management Module's operation, installation, and configuration. This guide also describes the software commands associated with the distributed management module.

Distributed Management Module Commands Guide – Describes each management command by providing detailed information on the command's format, use, and description.

For a complete list of 3Com documents, contact your 3Com representative.

Reference Documents

The following documents supply related background information:

Case, J., Fedor, M., Scoffstall, M., and J. Davin, *The Simple Network Management Protocol*, RFC 1157, University of Tennessee at Knoxville, Performance Systems International and the MIT Laboratory for Computer Science, May 1990.

Rose, M., and K. McCloghrie, *Structure and Identification of Management Information for TCP/IP-based Internets*, RFC 1155, Performance Systems International and Hughes LAN Systems, May 1990.

1 INTRODUCTION

This chapter describes features of the 3Com CoreBuilder™ 5000 Ethernet 24-Port 10BASE-T Module (Model Number 6124M-TPL6). For more information on the 3Com® CoreBuilder 5000 hub, refer to the *CoreBuilder 5000 Integrated System Hub Installation and Operation Guide*.

The CoreBuilder 5000 Ethernet 24-Port 10BASE-T Module

The CoreBuilder 5000 Ethernet 24-Port Module is an IEEE 802.3 repeater module that complies with the 10BASE-T standard. It connects up to 24 devices (PCs, terminals, printers, modems, etc.) to the CoreBuilder 5000 hub. Two 50-pin Telco-type connectors connect to 24 10BASE-T-compliant ports using 25-pair 10BASE-T cables or 12-leg "hydra" cables.

The 24-Port module provides the following features and benefits:

- Provides per-port switching on all eight of the backplane segments and all eight of the isolated segments (supports up to six segments simultaneously).
- Offers high port density at a low cost per port.
- Supports up to 100 meters on 10BASE-T-compliant unshielded twisted pair (UTP) wiring.
- Features hot swap capability so that you can install or remove the module without having to power down the hub.
- Supports scalable network management architecture which includes one Network Monitor Card (NMC) per 24-Port module.
- Supports the CoreBuilder 5000 Ethernet security card for private Ethernet conversations.
- Provides system-configured autopartition threshold, for flexibility in dealing with collision-related network slowdowns.

- Includes *increased workgroup capability* which enables administrators to create more networks that exist on the module instead of the backplane.
- Maintains inventory information for the 24-Port module in non-volatile RAM (NVRAM). Such information includes the module's serial number, power requirements, power class settings (i.e., power-up priority) and date of manufacture.
- Supports the CoreBuilder 5000 power management system which enables administrators to prioritize the allocation of power to modules.

All ports on the 24-Port module are internally crossed over as per the 10BASE-T standard. This enables the 24-Port module to be connected to a 10BASE-T transceiver without an external crossover adapter.

In addition to complying with the 10BASE-T standard, the module allows Link Integrity to be disabled (which allows connection to some equipment that does not conform to the 10BASE-T standard). Figure 1-1 provides a detailed illustration of the CoreBuilder 5000 Ethernet 24-port Module.

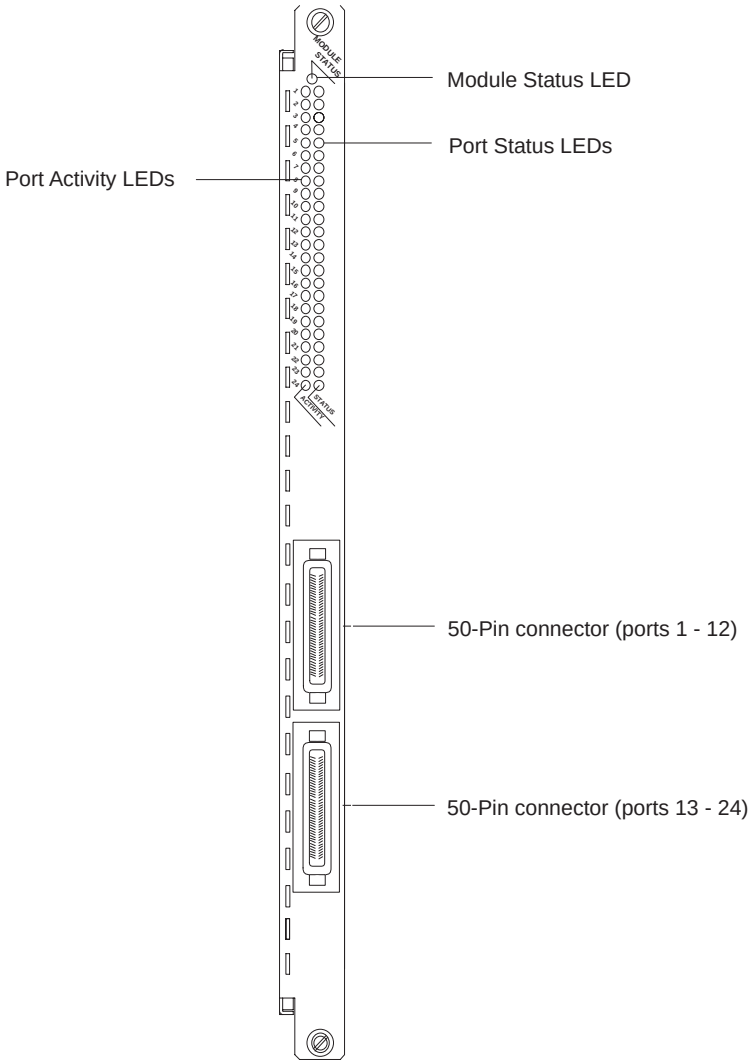


Figure 1-1 CoreBuilder 5000 Ethernet 24-Port Module

Application This module can be attached via bundled 25-pair or 12-leg hydra cables to a patch panel or punch-down block, which provides connections for the 24 twisted pair ports, as shown in Figure 1-2.

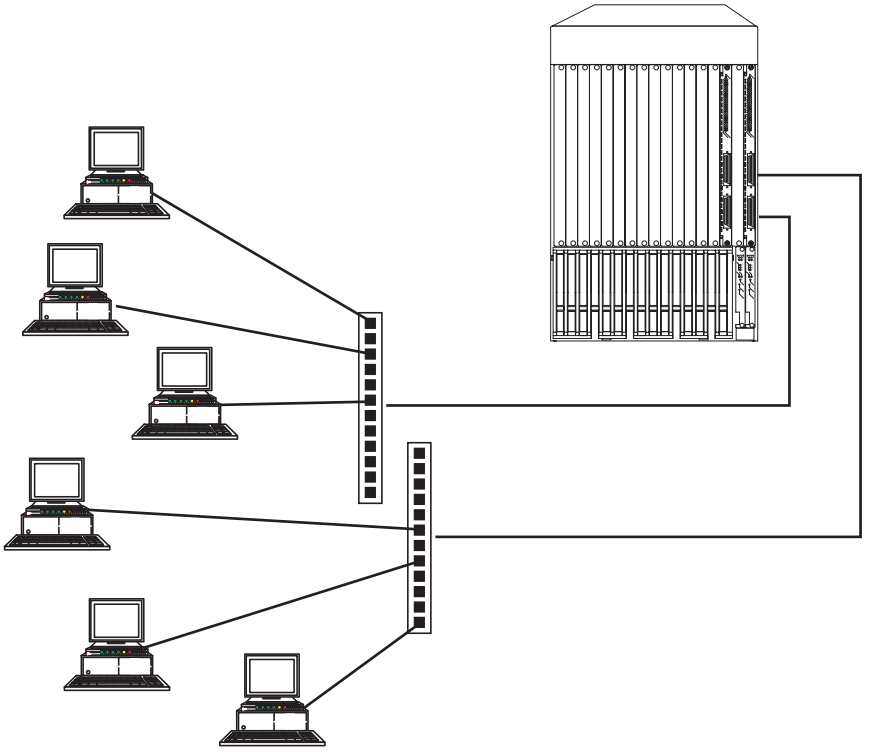


Figure 1-2 Typical 24-Port Module Application

Theory of Operation

The 24-Port module incorporates repeaters and twisted pair transceivers in its hardware. Transceivers receive and restore amplitude to incoming signals. A repeater restores phase and frequency. Repeated signals synchronize to the system clock and enter on the CoreBuilder 5000 hub's backplane. Outgoing signals from the backplane are sent directly to transceivers to be transmitted to twisted pair link segments.

Where To Go From Here

Now that you are familiar with the 24-Port module, we suggest that you evaluate the environment in which you plan to use this module. Chapter 2, Designing and Expanding the Network, lists cabling considerations and configuration examples specific to the 24-Port module in the CoreBuilder 5000 hub.

2 Designing and Expanding the Network

This chapter contains information to help you design your network. It describes how to configure networks that use the CoreBuilder™ 5000 hub and the CoreBuilder 5000 Ethernet 24-Port Module. It also provides examples of network cabling structures and Ethernet network cabling solutions. This chapter outlines the following topics:

- Understanding the General Rules
- Fiber Backbone, Twisted Pair To-The-Desk
- Twisted Pair Backbone, Twisted Pair To-The-Desk
- Module Workgroups
- Patch Panels
- Redundant Links

CAUTION: *To ensure proper operation, install all equipment using only approved cables. Refer to Appendix A for information on twisted-pair connector and cable requirements.*

Understanding the General Rules

As part of your network design, it is important to consider your network size. For instance, is the network (end-to-end) 100 meters, 1000 meters, 4000 meters, or more? What are your plans for expansion? Your answers play a role in how you configure your network. For example, once the network expands beyond a certain size, you may need to add a bridge or other internetworking device.

This section describes general rules for configuring an Ethernet network using fiber as the backbone medium, and twisted pair as the horizontal medium. It also provides rules to ensure that your network configuration conforms to distance limitations imposed by Ethernet and networking equipment. The following topics are discussed:

- Basic Network Rules
- LAN Equivalence

Basic Network Rules

This section outlines the basic network rules and 3Com recommendations for these rules. For more hardware-specific information on the 24-port module, refer to Appendix A.

Table 2-1 outlines the seven basic rules to keep in mind when you construct your network

Table 2-1 Seven Basic Network Rules

Rule	Definition	Recommendations/Notes
1	If possible, use 10BASE-FB as the backbone medium.	Use 62.5 micron cable to conform with IEEE 10BASE-F and the upcoming ANSI FDDI standards.
		Use ST-type connectors.
2	Wire the backbone in a star topology to isolate faults.	Make sure to lay extra fiber cables. The extra cost is small and you will find you need them as your network grows.
		The star topology conforms to FDDI wiring as well. Ensure that you run at least two fiber strands to every backbone connection.

Table 2-1 Seven Basic Network Rules (continued)

Rule	Definition	Recommendations/Notes
3	The maximum Fiber Ethernet network diameter is 4200 meters of fiber cable.	The 4200 meters is the maximum distance between any two transceivers on the network.
		The 4200 meters *does not include* the transceiver cable (that is, drop or patch cable) that connects a device with an external transceiver. Transceiver cables can extend up to 50 meters. Thus, total network diameter can be as much as 4300 meters (4200 m + 2 * 50 m) between any two nodes.
4	Certain LAN devices on the network shrink the maximum Fiber Ethernet network diameter to less than 4200 meters.	Many LAN products delay the signal that goes through them. This is known as *equivalent distance*. Every microsecond delay reduces the maximum link distance. In fact, every microsecond delay shrinks the network diameter by approximately 200 meters of fiber cable. Table 2-2 lists the Equivalent Distances for other 3Com products.
5	Assume that one meter of coax or twisted pair is equal to one meter of fiber cable.	This is a conservative rule of thumb. For example, the actual equivalence is about 1.1 meters of coax for every meter of fiber. For simplicity, assume one meter.
6	The fiber link distances must not exceed the limits imposed by the optical power budget.	In general, on 62.5 micron cable, you can go up to 4000 meters point-to-point using the CoreBuilder 5000 or ONline fiber modules. If you have poor quality cable or cross many patch panels, you may have to sacrifice some distance.
		Some older Ethernet fiber optic products are less powerful than CoreBuilder 5000 fiber module optics. So when connecting to these products, remember that the least powerful device determines the maximum point-to-point distance.
7	When in doubt, use a bridge.	If you are not certain if you have exceeded allowable network distances, use a bridge to extend the network.

LAN Equivalence

In essence, LAN equivalence is the sum of both the incoming and outgoing module port signals. Different modules, however, have different equivalent distances. Table 2-2 lists the LAN product equivalent distances.

Table 2-2 LAN Product Equivalent Distances

LAN Product	Equivalent Distance (meters)
CoreBuilder 5000 Ethernet 10BASE-T Module (6124M-TPL6)	585
Incoming signal to TP port	420
Outgoing signal from TP port	165
ONline Ethernet 10BASE-T Modules (5124M-TPCL, 5221M-TP, 5112M-TPL, 5112M-TPPL, 5108M-TP)	585
Incoming signal to TP port	420
Outgoing signal from TP port	165
ONline Ethernet Fiber Module (5104M-FIB, 5104M-FP, 5104M-FB, 5104M-FBP, 5102M-FP, 5102M-FB 5102M-FBP)	190
Incoming signal to fiber port	140
Outgoing signal from fiber port	50
ONline Ethernet FOIRL Module (5104M-FL)	560
Incoming signal to fiber port	330
Outgoing signal from fiber port	230
ONline Ethernet Transceiver Module (5103M-AUIM)	0
ORnet Star Coupler (8 or 14 port) (9308S, 9314S)	180
ONline Ethernet BNC Module (5106M-BNC)	900
Incoming signal to BNC port	450
Outgoing signal from BNC port	450
ONline Ethernet repeater Module (5102M-AUIF)	800
Incoming signal to AUI port	600
Outgoing signal from AUI port	200
IEEE Repeater	800

Fiber Backbone, Twisted Pair To-The-Desk

When you configure a network with unshielded twisted-pair cabling to the desk and fiber for the backbone, pay particular attention to the following rules:

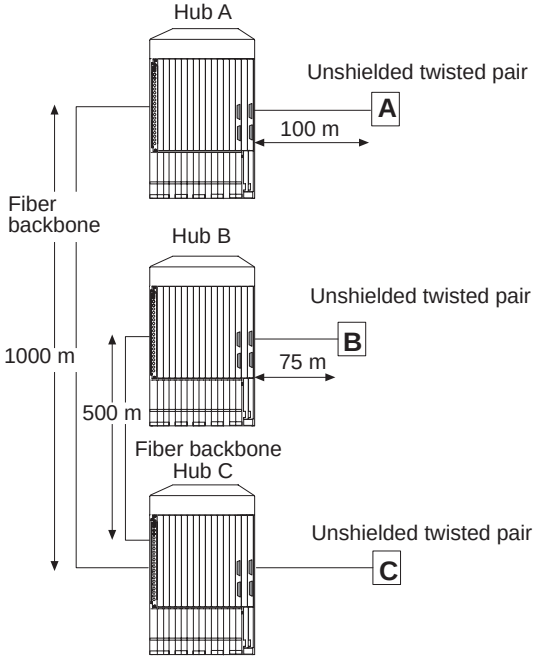
- You must add a bridge if you need to exceed four full repeater hops. When traffic goes into a port on any repeater-based module and out the backplane it counts as a 1/2 repeater. When the traffic goes into the module through one port and out another port on the same or a different module, it counts as one full repeater hop.
- There is an equivalent fiber distance for the 3Com Ethernet fiber modules (see Rule 4). The equivalent is:
  - 140 meters for signals that enter a fiber module port at the front panel
  - 50 meters for signals that internally enter a fiber module via the CoreBuilder 5000 hub backplane
- There is an equivalent fiber distance for the 24-Port modules (see Rule 4). The equivalence is:
  - 420 meters for signals that enter the 24-Port module port at the front panel
  - 165 meters for signals that internally enter a 24-Port module using the CoreBuilder 5000 hub backplane

Thus, for every pair of 24-Port modules that a signal goes through, there is a fiber equivalent distance of 585 meters (420 m + 165 m = 585 m) that must be deducted from the overall allowable network diameter. This is also true if a signal enters the 24-Port module through one port and exits another port of the same 24-Port module. This counts as 585 meters of fiber equivalent distance, and as a full repeater hop.

Fiber Backbone, Twisted Pair To-The-Desk

In the sample configuration shown in Figure 2-1, we determine if the transceivers are within legal Ethernet distance limits. Note that 24-gauge unshielded twisted-pair cable is used to connect 10BASE-T transceivers to the 24-Port modules in the hubs.

The first step is to identify the two transceivers that are the greatest fiber equivalent distance apart. In this case, they are 10BASE-T transceivers A and B.



Configuration Distance

1. Maximum Diameter:	4200 m
2. Equivalent Distances:	
Hub A:	470 m
Hub B:	305 m
Hub C:	190 m
Total:	965 m
3. Amount of cable between transceivers:	
	1000 m
	100 m
	500 m
	75 m
Total:	1675 m
4. Remaining Distance:	1560 m

Figure 2-1 Sample Configuration Distance Calculation

Use the following steps to determine whether your network configuration is legal:

1. Begin with 4.2 km (4200 m) since this is the maximum network diameter for a pure fiber network (Rule 3).
2. Determine the sum of each hub's equivalent distance based on the figures in Table 2-2. For example, Hub A has an equivalent distance of 470 m. This total represents the sum of the incoming signal to the UTP port (420 m) and the outgoing signal from the fiber port (50 m). Refer to Figure 2-1 for further details.

3 Subtract the total equivalent distance of each hub located between transceivers A and B [inclusive (965 m)] from the maximum network diameter (4200 m). In this case, your subtotal is 3235 m.

4 Determine the total amount of cable between transceivers A and B (1675 m) and subtract this number from the subtotal determined in Step 3 (3235 m).

5 Your remaining distance equals 1560 m.

For the configuration shown in Figure 2-1 to work, the fiber equivalent distance between transceiver A and transceiver B must be less than 4200 meters. As you can see in the calculation, there are still 1560 meters left for expansion in this configuration.

Note that the link from a 24-Port module to a 10BASE-T transceiver should not exceed the 100 m distance specified in the IEEE 10BASE-T standard.

Twisted Pair Backbone, Twisted Pair To-The-Desk

In constructing a twisted pair backbone, remember the following rule:

- There can be no more than eight 24-Port modules in the path between any two transceivers due to Ethernet's four-repeater rule. This is because each 24-Port module counts as a 1/2 repeater *unless* the signal goes in one port and out another port of the same module, in which case the module counts as a full repeater.

  You must add a bridge if you have more than eight 24-Port modules serially connected. Each bridge creates a subnetwork. Each subnetwork can have its own 4200 meter network diameter.

The configuration in Figure 2-2 illustrates a possible unshielded twisted-pair network using 24-gauge cable.

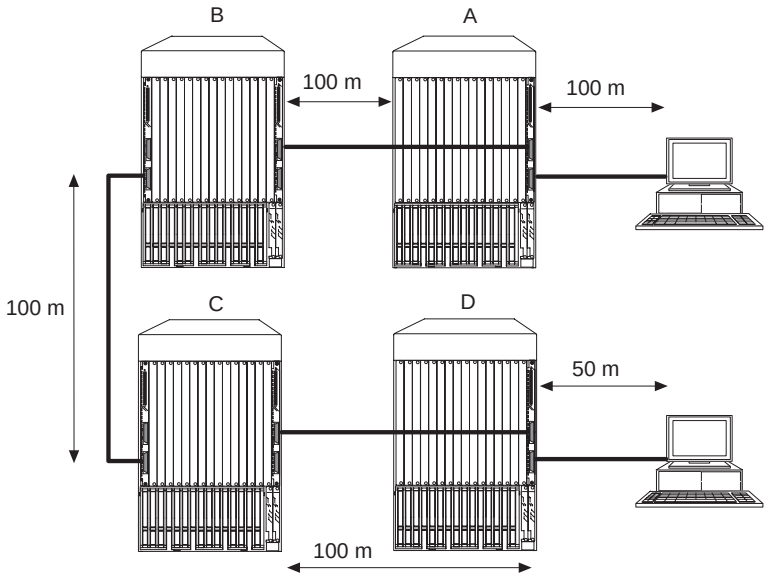


Figure 2-2 Unshielded Twisted Pair Network

While there is no fiber in this configuration, the fiber equivalent distance can be calculated as follows:

- Total amount of cable between workstations:

  100 m + 100 m + 100 m + 100 m + 50 m = 450 m

- Total equivalent distance of the 24-Port modules:

  Each hub has an equivalent distance of (420 m + 165 m) or 585 m[1].

  There are four hubs with a total equivalent distance of (585 m * 4) or 2340 m

  [1](Incoming signal to the UTP port on each hub = 420 m)

  (Outgoing signal from the UTP port on each hub = 165 m)

See Table 2-2 for more information on LAN product equivalent distances.

Although the unshielded twisted pair network example in Figure 2-2 only uses 24-Port modules, it is also possible to use other 10BASE-T modules.

Total equivalent distance: 450 m + 2340 m = 2790 m

Since the total equivalent distance (2790 m) is less than 4200 meters, this is a legitimate configuration.

Module Workgroups

When you set up a 24-Port module as a fully configured workgroup module, you are actually configuring a logical network that supports up to six workgroups (isolated networks) per module. Since a managed CoreBuilder 5000 hub may contain as many as 16 CoreBuilder 5000 24-Port Modules, it is possible to configure your hub with a maximum of 96 workgroups.

Before you configure your network, however, you should familiarize yourself with the advantages of creating workgroups in your network. The following section discusses these advantages.

Although the CoreBuilder 5000 24-Port Module has access to eight backplane and eight isolated segments, the module only supports per-port switching on six segments simultaneously.

Configuring Workgroups

One of the primary advantages of dividing your network layout into smaller isolated networks is the potential increase of network workgroups. Workgroups enable administrators to have more flexibility in organizing their network, while simultaneously decreasing the amount of traffic on the backplane segments of the hubs in which the workgroups reside. The following section provides a detailed example of how workgroups help administrators to efficiently organize users in their network.

Dividing the Network into Workgroups

Network administrator Jane Smith plans to reorganize the development and support organizations in her company by dividing each department within those organizations into separate workgroups. Currently, each of the organizations are connected to separate backplane segments as shown in Figure 2-3.

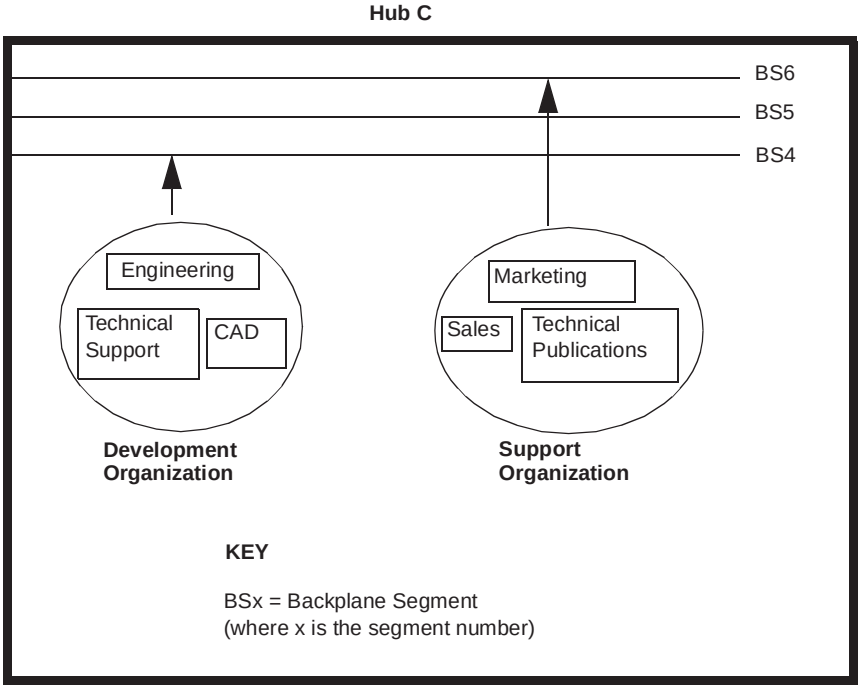


Figure 2-3 Current Organizational Structure

After studying each department's needs, Smith decides to:

- create separate workgroups for each department within the two organizations
- connect the workgroups to each other through an internal bridge

Table 2-3 provides an in-depth examination of the reorganization of each department.

Table 2-3 Network Reorganization

Department	Ethernet Module Type	Module Slot step next	Workgroup step next	Ports Used
Technical Publications	24-Port	6	WG1	1 - 7
CAD Department	24-Port	6	WG2	9 - 23
Engineering Department	24-Port	8	WG3	1 - 22
Technical Support	24-Port	1	WG4	2 - 24
Sales	24-Port	3	WG5	1 - 9
Marketing	24-Port	3	WG6	11 - 23

As Table 2-3 indicates, Smith has divided six organizations within her company into separate workgroups (WG1 to WG6). This enables the workgroups to access shared resources and communicate with each other without using the hub's backplane. Figure 2-4 provides a detailed example of each workgroup configuration.

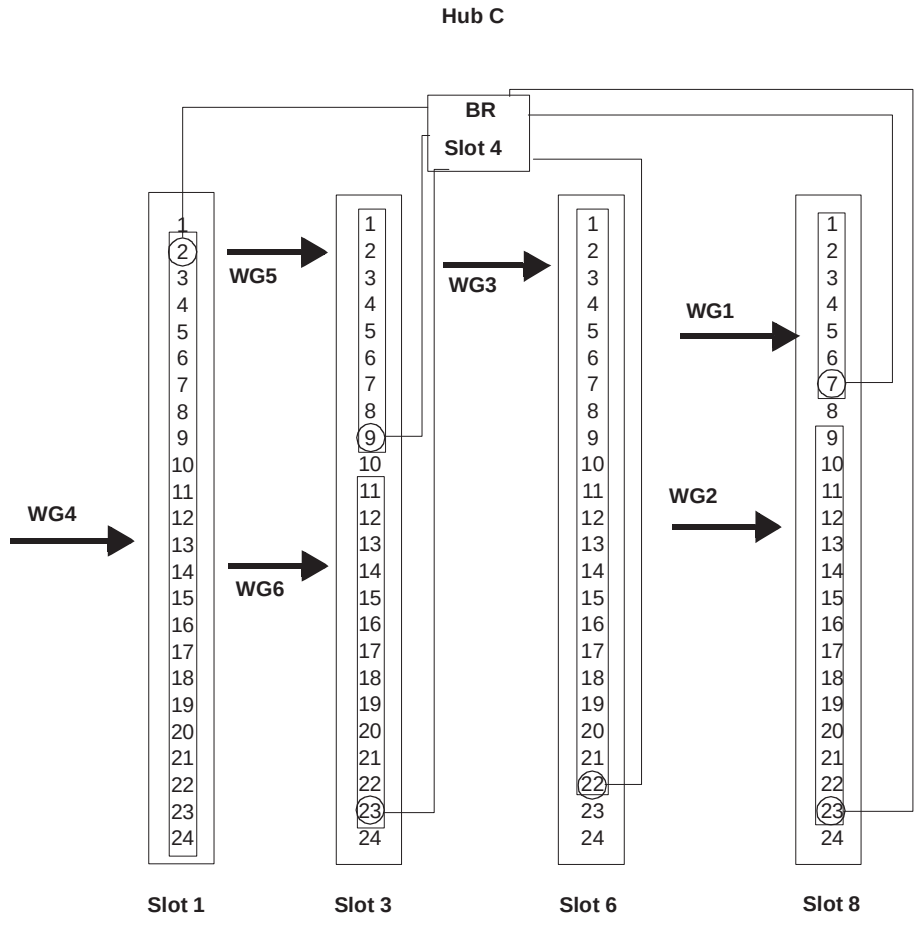


Figure 2-4 Workgroup Port Allocation

To enable all of the workgroups to communicate with each other, Administrator Smith must connect at least one port per workgroup to the bridge (See Figure 2-4).

By dividing her network into workgroups, Smith has increased the available number of backplane resources, while actually decreasing overall backplane traffic. For instance, in Figure 2-4, Smith configured six separate workgroups (WG1 to WG6) and connected the workgroups to each other using an internal bridge module. The advantages of this configuration include the following:

- networks configured as module workgroups provide greater network capacity

  (8 backplane networks and 96 module workgroup networks)
- network configuration is more flexible
- communication between each department is isolated from the hub backplane

If Smith had configured each of her workgroups on separate backplane segment networks instead of separate module workgroup networks, she would need to isolate 6 of the hub's 8 backplane segments from the rest of the network. The advantage to configuring module workgroup networks is clear. By configuring the departments as module workgroup networks instead of separate backplane segment networks, Smith can configure a maximum of 96 workgroups per hub using little or no backplane traffic.

It is also possible to connect isolated workgroups to the rest of the network using an internal bridge module that is connected to the hub backplane.

Patch Panels

Patch panels weaken signals that pass through them, thereby reducing achievable link distances. 3Com assumes the use of one patch panel in the 100 meter link distance calculations specified in this manual. However, each additional patch panel in the link reduces the 100 meter link distance by approximately 10 meters.

In the example shown in Figure 2-2 on page 2-8, if two patch panels were used between the top right PC and the top right hub, the link distance of 100 meters would have to be shortened to 90 meters. This is because the maximum allowable link distance on 24-gauge wire using 10BASE-T signaling with two intervening patch panels is 100 meters minus approximately 10 meters.

Note that a patch panel installed between the bottom right PC and the bottom left hub would not affect the link since it is only 50 meters away.

Redundant Links

You can implement twisted-pair link redundancy between CoreBuilder 5000 hubs using network management. Figure 2-5 shows two examples of a redundant configuration.

It is also possible to enable redundancy between ONline modules in a CoreBuilder 5000 hub.

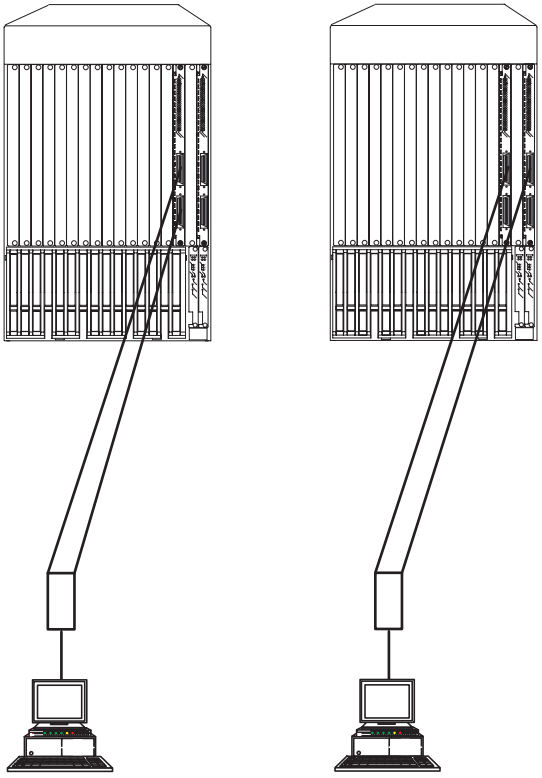


Figure 2-5 Redundant Twisted-Pair Configuration

To set link redundancy between two 24-Port modules, connect two links to two ports on the 50-pin cables between the modules. You need to use a crossover adapter between each link because the links are designed to be connected to a LAN card in an end node, not to other module ports. Use the SET PORT {slot.port} MODE REDUNDANT {slot.port} network management command to specify which port is the primary link and which is the backup link. For example, if you set up a redundant link with the following:

```
SET PORT 7.4 MODE REDUNDANT 8.9
```

Port 4 in slot 7 becomes the primary link and port 9 in slot 8 becomes the backup link.

CAUTION: *Redundancy on the 24-Port module is a management module software function. Consequently, a network loop could occur if the module is set to redundant mode and it is powered down and then brought back up without a management module in the hub.*

Once redundancy is configured, a switchover to the backup link occurs under two conditions: a link failure or a port partition. Once the switchover occurs and the backup link becomes operational, a switchover back to the primary link happens automatically once the problem is resolved.

Although it is possible to configure redundancy between two ports on a single module, we recommend that you configure redundancy between two ports on two different modules. This provides more protection if, for example, one of the modules becomes inoperative.

Refer to the *Distributed Management Module User Guide* for information on setting redundancy between 24-Port module ports.

Where To Go From Here

Once you complete this chapter, proceed to Chapter 3. Chapter 3, Installing and Operating the Module, describes installation procedures and explains how to set the DIP switches, configure the module through network management, and monitor the front panel using the LEDs.

3 Installing and Operating the Module

This chapter describes the installation procedures for the 24-Port module. Please read the precautionary procedures before unpacking the module.

For your convenience, we have included a quick reference installation card (17-00368). This card lists the DIP switch settings, 24-Port module management commands, LED indicators and other module information. Please store this card in the CoreBuilder 5000 hub reference binder in the Reference Card area.

The remainder of this chapter describes:

- Precautionary Procedures
- Unpacking Procedures
- Quick Installation
- Module Overview
- Setting the DIP Switches
- Installing the Module
- Configuring the Module
- Showing Module Configurations
- Gathering Statistics
- Monitoring the Front Panel
- LED and Network Verification

These topics are discussed in the following sections.

Precautionary Procedures

Electrostatic discharge (ESD) can damage static-sensitive devices on circuit boards. Follow these precautions when you handle the 24-Port module.

- Do not remove the board from its antistatic shielding bag until you are ready to inspect or install it.
- Handle the board by the faceplate only.

Use proper grounding techniques when you install the 24-Port module. These techniques include using a foot strap and grounded mat or wearing a grounded static discharge wrist strap. An alternate method is to touch the grounded rack or other source of ground just before you handle the module.

Unpacking Procedures

Use the following procedure when unpacking your 24-Port module.

1. Verify that the 24-Port module is the model you ordered by checking the model number listed on the side of the shipping carton (6124M-TPL6).

   Note that the product model number printed on the shipping box differs from the model number on the product. The model number on the shipping box contains the prefix '3C9'.

2. Remove the 24-Port module, in its antistatic bag, from the shipping carton.

3. Remove the module from the antistatic shielding bag and inspect it for damage.

   Save the packages of screws in the carton; you'll need them when you attach connectors to the module. Always handle the 24-Port module by the faceplate, being careful not to touch the components. If the module appears to be damaged, return it to the antistatic shielding bag, repack it in the shipping carton, and contact your local supplier.

   Keep the shipping carton and antistatic shielding bag in which your module was shipped so that you can repackage the module for storage or shipment.

We also suggest that you record the serial number of your 24-Port module. The Hub Planning Charts, located in the CoreBuilder 5000 hub reference binder, are provided for this purpose.

Quick Installation

Table 3-1 outlines the steps necessary to complete the installation of your module. If you are familiar with installing CoreBuilder 5000 modules, use this table as a checklist. Otherwise, consult the remainder of this chapter.

Table 3-1 Procedures for Completing Installation

Step	Procedure	Reference
1	Verify that your network complies with the basic rules for network design.	Designing and Expanding the Network (Chapter 2)
2	Unpack the module.	Unpacking Procedures
3	Configure the DIP switch settings. If you have a network management module installed in the hub, configure the module using the management commands described later in this chapter.	Setting the DIP Switches or Configuring the Module
4	Enter the SHOW POWER† command at the command line of the terminal. This command displays current power requirements for the hub.	Installing the Module
5	Insert the module into an open slot in the hub and fasten the ejectors and tighten the faceplate screws. Use proper ESD precautionary procedures when handling the module.	Installing the Module
6	Establish connections from the 24-Port module to devices or a 10BASE-T transceiver using the appropriate connectors and cabling.	Installing the Module
7	Verify LED status for normal operation.	LED and Network Verification

†Refer to the *CoreBuilder 5000 Integrated System Hub Installation and Operation Guide* for more details on hub power requirements.

For information about potential problems, consult the troubleshooting techniques in Chapter 4.

Module Overview

The 24-Port module is a port-switching module. Essentially, this enables users to assign a backplane segment (network) at the port level of the module. This feature gives the user greater flexibility in both workgroup creation and module configuration.

In addition, the CoreBuilder 5000 scalable network management architecture enables users to add a CoreBuilder 5000 Ethernet Network Monitor Card to the module. This card enables users to gather network statistics for any of the CoreBuilder 5000 backplane segments. Once attached to the 24-Port module, you must assign the monitor card to the network on which you will gather statistics. Note that it is possible to install the monitor card on either the 24-Port module or the distributed management module for Ethernet (DMME). For more information on network statistics, refer to the section Gathering Statistics later in this chapter. For more information on the DMME, refer to the *Distributed Management Module User Guide*.

The CoreBuilder 5000 Ethernet Network Monitor Card does not provide per-port statistics for ONline modules when it is installed on the 24-Port module. If, however, the card is installed on the DMM-EC, it is possible to collect per-port statistics for ONline modules.

Setting the DIP Switches

The 24-Port module has an eight-position DIP switch located on the module. This switch lets you perform the following:

- Select a network channel for all 24 ports on the 24-Port module
- Configure all 24 ports of the module into one workgroup or module segment
- Choose the primary module configuration – Non-volatile RAM configuration (software configuration) or DIP Segment selection (DIP-specified module configuration)

It is not possible, using the DIP switches on the 24-Port module, to assign ports to different networks.

Note that all of the DIP switch settings on the 24-Port module are ignored if an appropriate CoreBuilder 5000 Distributed Management Module (DMM 1.0 or later, for example) is already installed in the hub. For this reason, we recommend that you use distributed management commands, rather than the DIP switches, to configure the module. If you'd like the module to access the DIP switch settings when using a management module, issue the `SET DEVICE DIP_CONFIGURATION` command from the management module.

If you do not have a CoreBuilder 5000 Distributed Management Module installed in your hub, your hub's configuration defaults to the dip switch settings on the module.

If you are using a management module and do not plan to use the dip configuration command, skip this section and proceed to the section Installing the Module in this chapter. Figure 3-1 provides an illustration of the switch locations on the module.

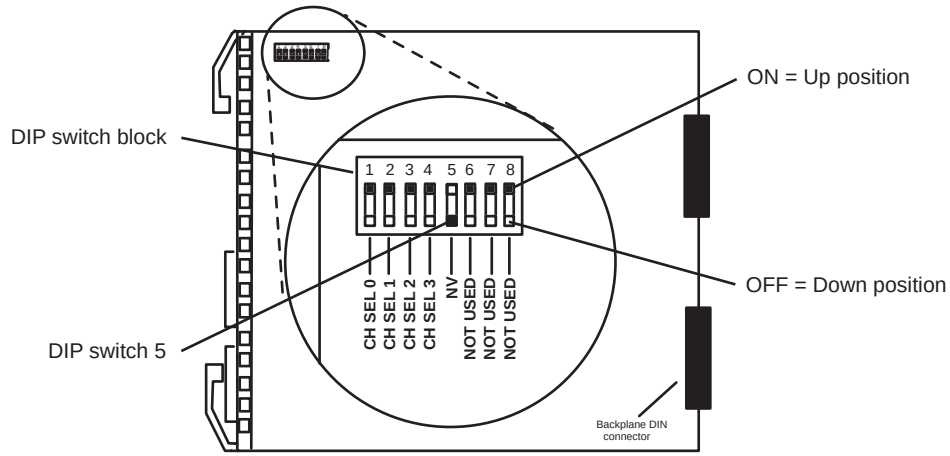


Figure 3-1 24-Port Module and DIP Switch Location

Table 3-2 briefly describes the DIP switch settings. The complete definition of each DIP switch function is contained in the section Configuring the Module later in this chapter.

The DIP switch legend on the module refers to the backplane connection as the "channel" selection (CH SEL). The "channel" setting and the "network" setting are the same. Ports set to the same network will communicate with each other.

In Table 3-2, the switches are labeled 1 through 8. Switches 1 through 4 enable users to configure all ports for one of the backplane segments (ethernet 1 to ethernet 8) or as a workgroup (Isolate_1). DIP Switch 5 enables users to switch between Non-volatile RAM (NVRAM) or DIP-switch controlled configuration. Switches 6, 7, and 8 are not used.

***DIP Switch 5** must be set to the positions listed below when configuring network assignments using:*

– NVRAM in Off (down) position
– DIP switch in On (Up) position

Table 3-2 Channel Select DIP Switch Settings

	Switch Settings†			
Network Selection	**Switch 1**	**Switch 2**	**Switch 3**	**Switch 4**
1 (default)	Off	On	On	On
2	On	Off	On	On
3	Off	Off	On	On
4	On	On	Off	On
5	Off	On	Off	On
6	On	Off	Off	On
7	Off	Off	Off	On
8	On	On	On	Off
Isolate_1	On	On	On	On

†By default, Switch 5 is set to NVRAM. When enabled, settings stored in NVRAM takes precedence over DIP Switch settings 1 through 4.

When the 24-Port module is first installed, the hub checks for configuration settings in the management module (for example, DMME). If the hub is unmanaged, then it checks for configuration settings stored in NVRAM. If, however, there are no configuration settings in NVRAM or DIP Switch 5 is set to DIP-switch controlled configuration, the hub then checks the DIPs for configuration information.

Installing the Module

You do not need to power off the CoreBuilder 5000 hub to install or remove the 24-Port module. You can insert the module while the hub is operating (this is called a hot swap). Follow the steps below to install the 24-Port module.

1 Properly ground yourself prior to handling the 24-Port module.

For example, attach a static wrist guard to yourself or touch a grounded static mat prior to handling the 24-Port module.

2 Configure the 24-Port module as follows:

- If you plan to install the 24-Port module in a managed hub (DMME Version v1.0 or later, for example), proceed to Step 3 to complete the installation. Then use the information in the section Configuring the Module later in this chapter to configure the appropriate settings.
- If you plan to insert the 24-Port module in an unmanaged hub, configure the DIP switch settings on the module to the desired settings (see the section Setting the DIP Switches earlier in this chapter) and proceed to Step 4.

3 Enter the SHOW POWER BUDGET command to ascertain if the hub has enough power for the new module. Refer to the section Electrical Specifications in Appendix A for more detailed information on the power needed for each of the specified Watt ranges.

Refer to the *Distributed Management Module Commands Guide* for more detailed information on the SHOW POWER BUDGET command.

4 Locate an open slot in the hub. Remove the blank panel on the hub to expose a slot for the module.

5 Insert the module into the board guides at the top and bottom of the slot and slide it into the hub by pressing firmly at the top and bottom of the faceplate. Figure 3-2 shows the installation of the module.

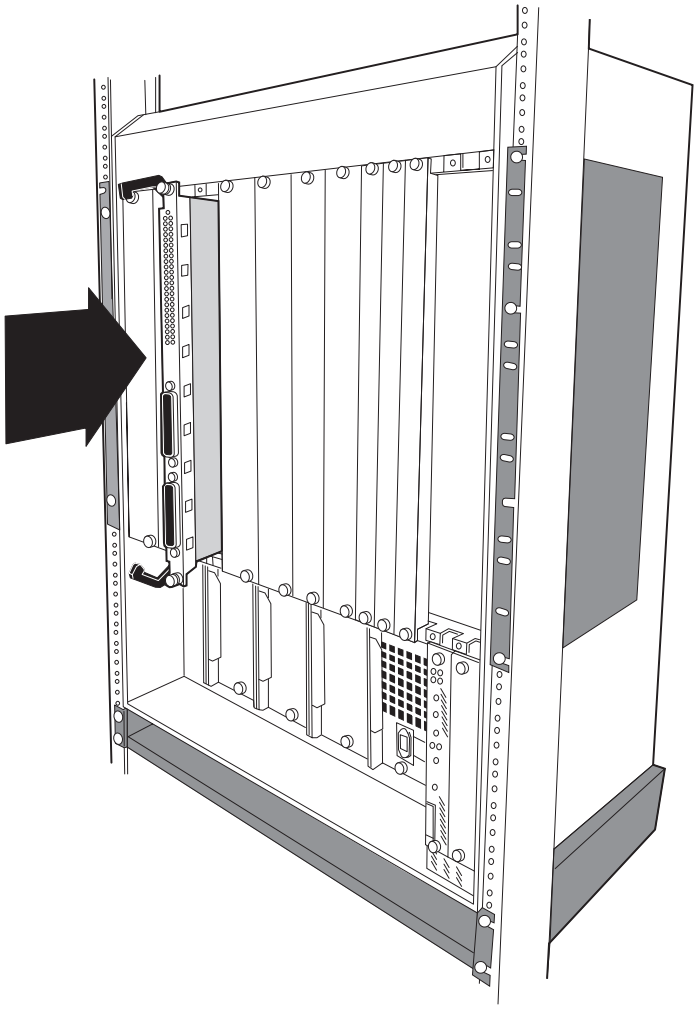


Figure 3-2 Installing a 24-Port Module

6 Close the 24-Port module ejectors as shown in Figure 3-3.

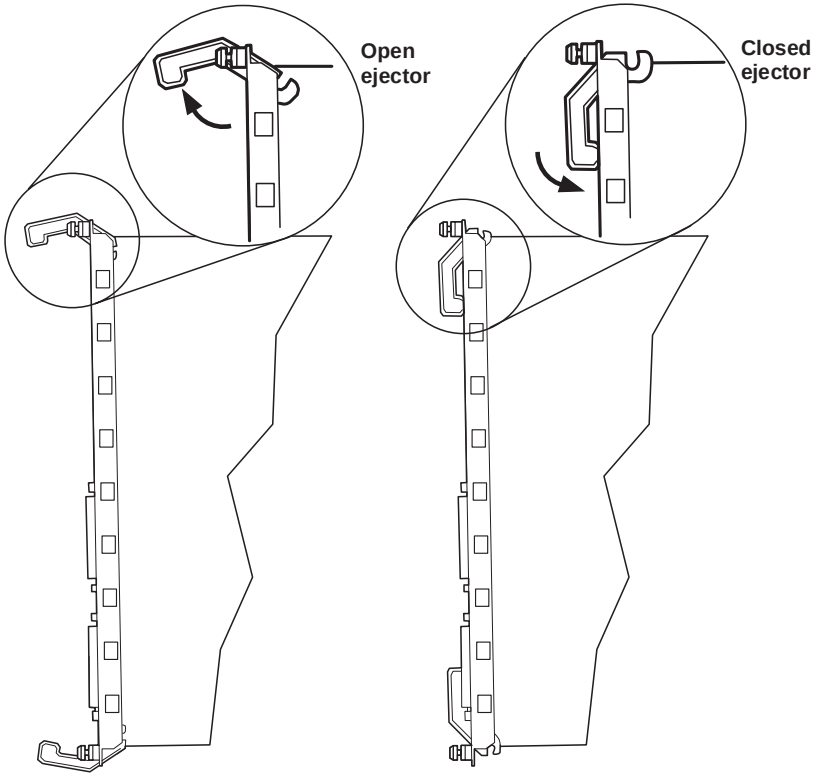


Figure 3-3 Open and Closed Module Ejectors

7 Fasten the spring-loaded screws on the front of the 24-Port module faceplate to the hub using your fingers (do not overtighten).

8 Attach 180° 50-pin cable connectors to the 50-pin connectors on the front of the module (see Figure 3-4), using the small screws included in the shipping carton. If you're using 90° connectors, refer to the section Using 90° Cable Connectors later in this chapter.

9 Secure the cables to the module connectors as shown in Figure 3-4.

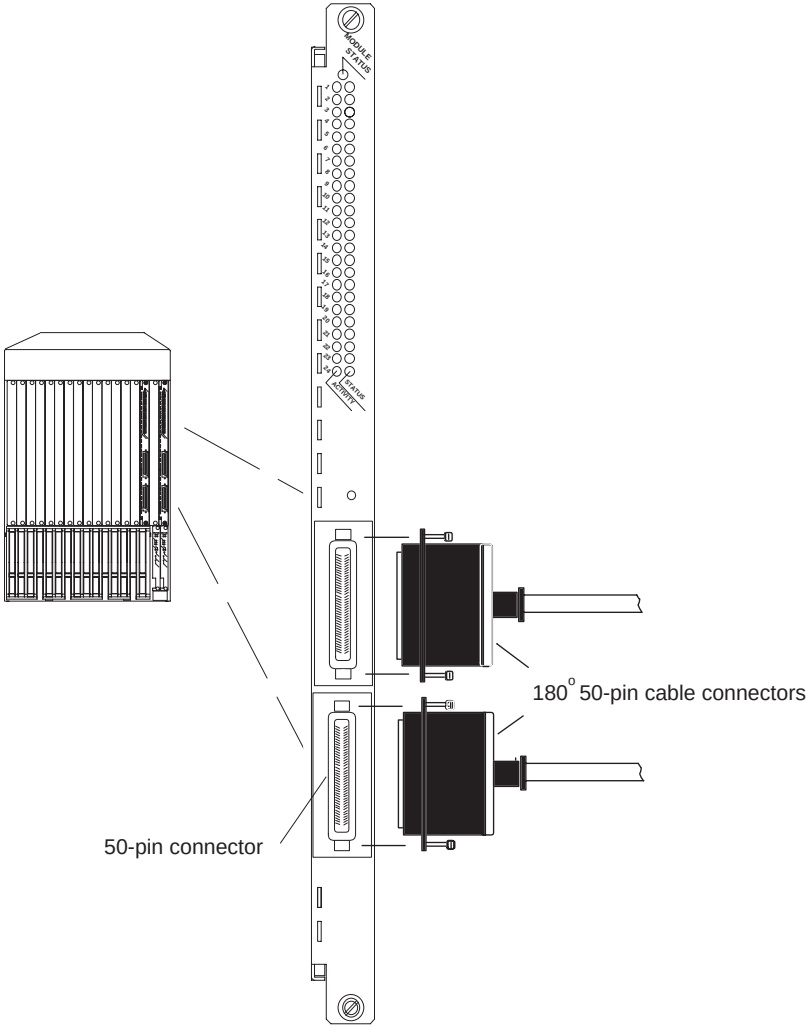


Figure 3-4 24-Port Module Cable Connection

10 Attach the other ends of the cables to a 10BASE-T transceiver, patch panel, or a 10BASE-T adapter card.

Using 90° Cable Connectors

3Com recommends that you use 180° connectors with this module. If, however, you currently use 90° cable connectors, use the following procedure to fasten the tie-wraps to your connector.

Perform this procedure prior to installing the module into the CoreBuilder 5000 hub.

1. Remove the hex nut from the bottom of the 50-pin module connector.
2. Attach the tie-wrap bracket to the 24-Port module using the phillips head screw provided in the tie-wrap kit (see Figure 3-5).

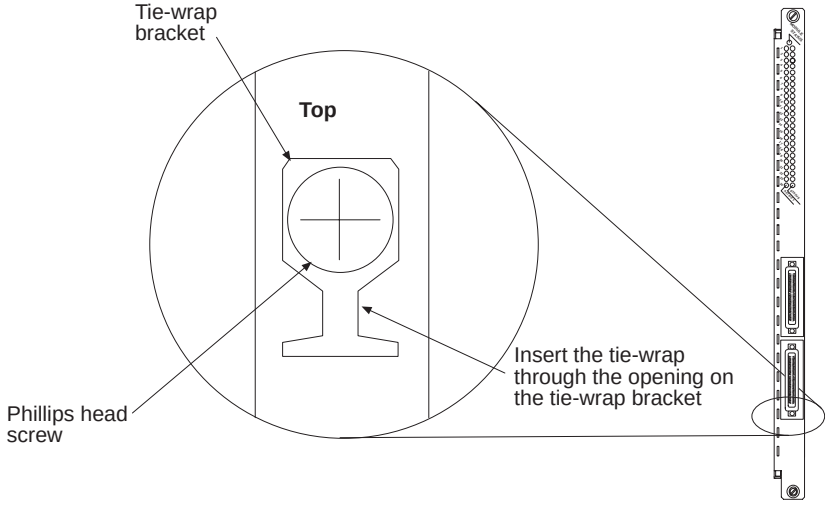


Figure 3-5 Attaching the Tie-Wrap Bracket to the 24-Port Module

3. Insert the tie-wrap through the opening on the tie-wrap bracket.
4. Attach the 90° cable connectors to the module connector on the 24-Port module as shown in Figure 3-6.

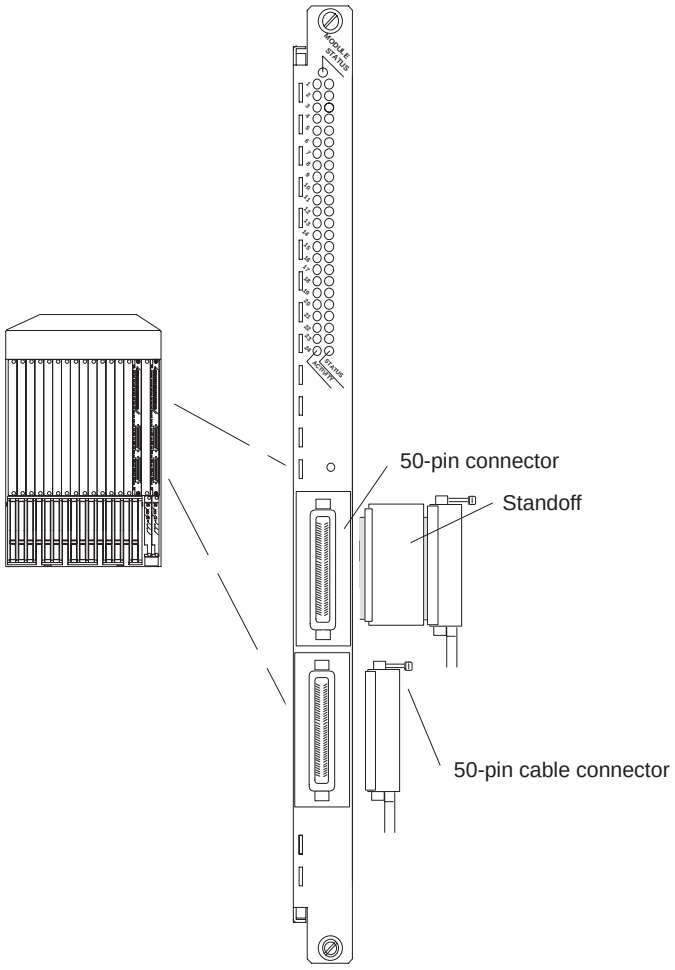


Figure 3-6 Attaching Cables with 90° Connectors

5 Wrap the tie-wrap connector strap around the 50-pin cable connector to secure the cable connector to the module connector.

6 Attach the other ends of the cables to a 10BASE-T transceiver, patch panel, or a 10BASE-T adapter card.

Ensure that you do not fasten the tie-wrap around the 24-Port module ejectors shown in Figure 3-3.

The next section describes the features you can set using network management commands.

Configuring the Module

The CoreBuilder 5000 Distributed Management Modules provide network management for the CoreBuilder 5000 hub and its modules. If you are using a Distributed Management Module, the dip switch settings on the 24-Port module are ignored. For this reason, use network management commands, rather than the dip switches, to configure the module.

Do not manage (get statistics or configure) this module from a slave management module.

If network management is present when you first install the module, the network (channel) defaults to isolated mode and the ports are automatically disabled (so that users can't join the network undetected by network management). Therefore, you must enable the ports you wish to use and set the module's ports to the appropriate network using management commands.

You can use network management to configure the following for 24-Port modules:

- enable/disable any port on the module
- configure redundancy
- enable/disable Link Integrity on any port
- select the Ethernet network (channel) for each port on the module
- configure remote diagnostics (if you will be connecting the ports using 3Com's Fault-Tolerant 10BASE-T Transceiver).

For additional information on any network management command described in this section, refer to the *CoreBuilder 5000 Distributed Management Module Commands Guide*.

Port Enable

You can enable or disable each of the ports on the 24-Port module. When a port is enabled, it can transmit to and receive data from the network (channel) to which the module port is assigned. Use the following network management command to enable a port:

```
SET PORT {slot.port} MODE {enable}
         {slot.all}       {disable}
```

Port Redundancy

Network management lets you set redundancy between ports. When you set two ports redundant to each other, the secondary port takes over if the primary port fails. Use the following network management command to set redundancy between ports:

```
SET PORT {slot.port} MODE {redundant} {slot.port}
                         {non-redundant}
```

Refer to Chapter 2 for an example of port redundancy.

Link Integrity

Enable Link Integrity for all ports on the 24-Port module in networks that comply with the 10BASE-T standard. Disable Link Integrity only when connecting to older equipment that does not comply with the 10BASE-T standard. Link integrity must either be enabled at both ends or disabled at both ends of the connection. If the settings differ, the module with Link Integrity enabled will report a Link Integrity error.

If you enable a port and disable Link Integrity, the Status LED for that port is on for 10 seconds and blinks off for 400 msecs to indicate that Link Integrity is disabled.

Using network management commands, you can enable/disable Link Integrity for each port on the module.

Use the following network management command to enable Link Integrity for a port:

```
SET PORT {slot.port} LINK_INTEGRITY {enable}
         {slot.all}                 {disable}
```

Alert Filter

This command allows you to override the SET ALERT option that you can use to disable port up and port down alerts. You can use this command to continue to monitor port status on crucial ports (file servers, for example), while alerts from other ports are disabled.

Use the following command to disable the port up and port down alerts for a port:

```
SET PORT {slot.port} ALERT_FILTER {enable}
                                  {disable}
```

The following output is an example of the SET PORT ALERT_FILTER command issued for port 1 of a module in slot 1:

```
CB5000> set port 1.1 alert_filter disable [ENTER]
Port 01.01 Alert Filter set to DISABLE.
```

For more information on this command, refer to the *Distributed Management Module Commands Guide*.

Auto Polarity

Auto Polarity enables the 24-Port module to automatically switch the polarity of twisted-pair cabling. If, for instance, you erroneously reverse the polarity of some twisted pair cabling while assembling it, Auto Polarity enables you to automatically detect this problem and reverse the polarity.

Use the following network management command to enable Auto Polarity for a port:

```
SET PORT {slot.port} AUTO_POLARITY {enable}
         {slot.all}                {disable}
```

Network Selection

The CoreBuilder 5000 Ethernet 24-Port Module provides port-level configuration flexibility using the CoreBuilder 5000 hub's unique architecture. You can assign ports collectively or individually, to any of eight backplane networks (or isolated module segments). Refer to Chapter 1 in the *CoreBuilder 5000 Integrated System Hub Installation and Operation Guide* for a complete discussion of the CoreBuilder 5000 hub architecture.

The dip switch settings on the module refer to the backplane connection as the "channel" selection (CH SEL). The channel setting and the network setting are the same.

The dip switch settings on the 24-Port module let you assign all ports (collectively) on the module to network 1 through 8 or to an isolated segment. Network management, however, lets you assign one or more ports to a network. If you have a CoreBuilder 5000 Ethernet Network Monitor Card, network management also enables you to assign the monitor card to a network.

The following command enables you to assign a monitor card to a network:

```
SET MODULE {slot.subslot} NETWORK {ethernet_1..._8}
                                  {isolated_1..._8}
```

The CoreBuilder 5000 Ethernet Network Monitor Card is configured as subslot 2 on the 24-Port module. The default, sublot 1, refers to the 24-Port module.

The following network management command assigns a port to a network:

```
SET PORT {slot.port} NETWORK {ethernet_1..._8}
         {slot.all}          {isolated_1..._8}
```

Use this command to assign users to backplane segments or isolated segments (workgroups). For instance, to create a module segment workgroup, you must assign all of the users in the workgroup to one isolated network (for example, ISOLATED_1). For more information on workgroups, refer to Module Workgroups in Chapter 2.

It is not possible to assign the CoreBuilder 5000 Ethernet Network Monitor Card to an isolated segment.

Remote Diagnostics

The Remote Diagnostics feature allows the 24-Port module to detect certain unusual failure conditions when used with a 3Com Fault-Tolerant 10BASE-T Transceiver (including disruption of single wires in the twisted pairs). The *Fault-Tolerant 10BASE-T Transceiver Installation Guide* describes this feature in detail. Use the following command to set this feature:

```
SET PORT {slot.port} MODE {REMOTE_DIAGNOSTICS} {slot.port}
                          {NON_REMOTE_DIAGNOSTICS}
```

Autopartition Threshold

The autopartition feature automatically partitions a port on the 24-Port module when more than 63 collisions are detected on that port. When a port is partitioned, additional collisions received on that port are not propagated to the rest of the network.

The 10BASE-T specification lists a minimum of 31 collisions prior to partitioning a port. Partitioning a port after 31 collisions, however, may cause ports to partition more frequently than necessary.

Saving the Configuration

After you make configuration changes to a module and ports, you must issue the SAVE MODULE_PORT command to save the new settings.

Failure to save module settings may result in loss of configuration data.

Showing Module Configurations

You can display status information about the 24-Port module using the following network management commands:

- SHOW MODULE
- SHOW MODULE VERBOSE
- SHOW PORT
- SHOW PORT VERBOSE.

These commands are explained in the following sections.

Show Module Command

The SHOW MODULE command enables users to display both brief and verbose information about a particular module. Use the following syntax to implement the command:

```
SHOW MODULE    {slot.subslot} {verbose}
               {slot.all}     {no_verbose}
```

The following output is an example of the SHOW MODULE VERBOSE command issued for a 24-Port module installed in slot 10:

```
CB5000> show module 10.1 verbose

Slot  Module        Version   Network     General Information
----- ------- ------------- ------------- -----------------
10.01 6124M-TPL6   v1.00     PER_PORT

6124M-TPL6: CB5000 Ethernet 24-PORT 10BASE-T Module

Non-Volatile DIP Setting:    ENABLED
```

Show Port Command

The SHOW PORT command enables users to display brief and verbose information on both individual ports and all ports collectively. Use the following syntax to implement the command:

```
SHOW PORT  {slot.port}  {verbose}
           {slot.all}   {no_verbose}
```

The following output is an example of the SHOW PORT ALL VERBOSE command issued for a 24-Port module installed in slot 4 (only the output for ports 1, 2, and 3 are shown):

```
CB5000> show port 4.all verbose


Port Display for Module 6124M-TPL6 :

Port   Mode      Status Network      General Information
----- -------- ----------------- -----------  -------------
04.01 ENABLED   OKAY   ETHERNET_2

Port Alert Filter:                  ENABLED
Port Connector:                     TELCO
Network Dip Setting:  ETHERNET_1
Link Integrity:                     ENABLED
Auto Polarity:                      ENABLED

04.02 ENABLED   OKAY   ETHERNET_2

Port Alert Filter:                  ENABLED
Port Connector:                      TELCO
Network Dip Setting:  ETHERNET_1
Link Integrity:                     ENABLED
Auto Polarity:                      DISABLED

04.03 ENABLED   OKAY   ETHERNET_5

Port Alert Filter:                  ENABLED
Port Connector:                     TELCO
Network Dip Setting:  ETHERNET_1
Link Integrity:                     ENABLED
Auto Polarity:                      ENABLED
```

Gathering Statistics

To monitor ethernet statistics on your 24-Port module, you must attach the CoreBuilder 5000 Ethernet Network Monitor Card to the network you wish to monitor. This card enables you to individually select and monitor each backplane segment of your hub. Figure 3-7 provides more detail on the location and installation of the card. For more details on the installation, refer to the documentation that accompanied the CoreBuilder 5000 Ethernet Network Monitor Card.

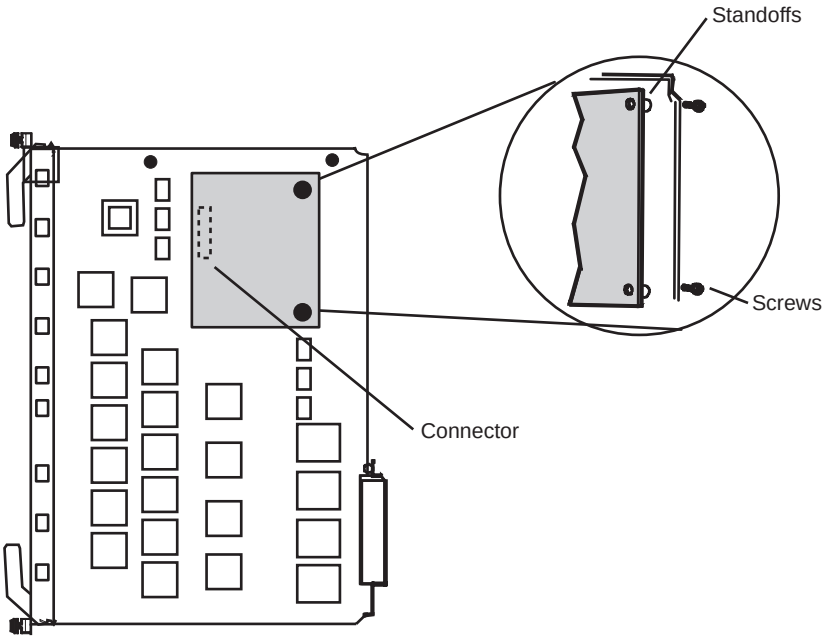


Figure 3-7 Attaching the CoreBuilder 5000 Ethernet Monitor Card

Monitoring the Network

Once the monitor card is attached to the 24-Port module, it is possible to monitor the network using the following commands:

- Monitor
- Show Counter

These commands are explained in more detail in the following sections.

Monitor Command

The MONITOR command enables users to monitor each network (individually) by specifying the backplane segment to which your ports are configured. Use the following syntax to implement the command:

```
MONITOR {mm:ss}  {ETHERNET} {ethernet_1..._8}
                 {REPEATER}
```

The system-specified range of time allotted for monitoring the network is 00 to 30 (minutes) and 05 to 59 (seconds). Use these values when specifying a length of time to monitor your network.

The following output is an example of the MONITOR ETHERNET command for a 24-Port module installed in slot 10. This example monitors ethernet_1 every 10 seconds:

```
CB5000> monitor 00:10 ethernet ethernet_1  [ENTER]


Ethernet Statistics for ETHERNET_1
------------------------------------------------------------
                              Cumulative      Last Time Interval
------------------------------------------------------------
FCS Errors                    0               0
SQE Test Errors               0               0
Alignment Errors              0               0
Carrier Sense Errors          0               0
Frame Too Longs               0               0
Deferred Transmissions        0               0
Late Collisions               0               0
Excessive Collisions          0               0
Single Collision Frames       0               0
Multiple Collision Frames     0               0
Internal MAC Receive Errors   0               0
Internal MAC Transmit Errors  0               0


Display will refresh every 10 seconds.
Press CTRL-C to exit.
```

Show Counter Command

The SHOW COUNTER command provides users with detailed information on ethernet, rmon, and repeater statistics. Use the following syntax to implement the command:

```
SHOW COUNTER  {ETHERNET} {ethernet_1.._8}
              {REPEATER}
              {RMON}
```

The following example provides a detailed example of RMON statistics:

```
CB5000> show counter rmon hosts ethernet_1 all  [ENTER]


RMON Hosts Table for Host Address 08-00-19-A4-B3 on Port 5.12
------------------------------------------------------------
Received Packets              24000
Received Octets               285000
Transmitted Packets           1200
Transmitted Octets            75000
Transmitted Errors            124
Transmitted Broadcast Packets 150
Transmitted Multicast Packets 280
```

For more information on repeater, ethernet, and rmon statistics, refer to the *CoreBuilder 5000 Distributed Management Module Commands Guide*.

Monitoring the Front Panel

The LEDs on the front panel of the 24-Port module allow you to monitor the status of each port. The 24-Port module has a pair of Activity and Status LEDs for each port. Figure 3-8 shows the location of the LEDs. Each LED indicates the state of a port as described in Table 3-3.

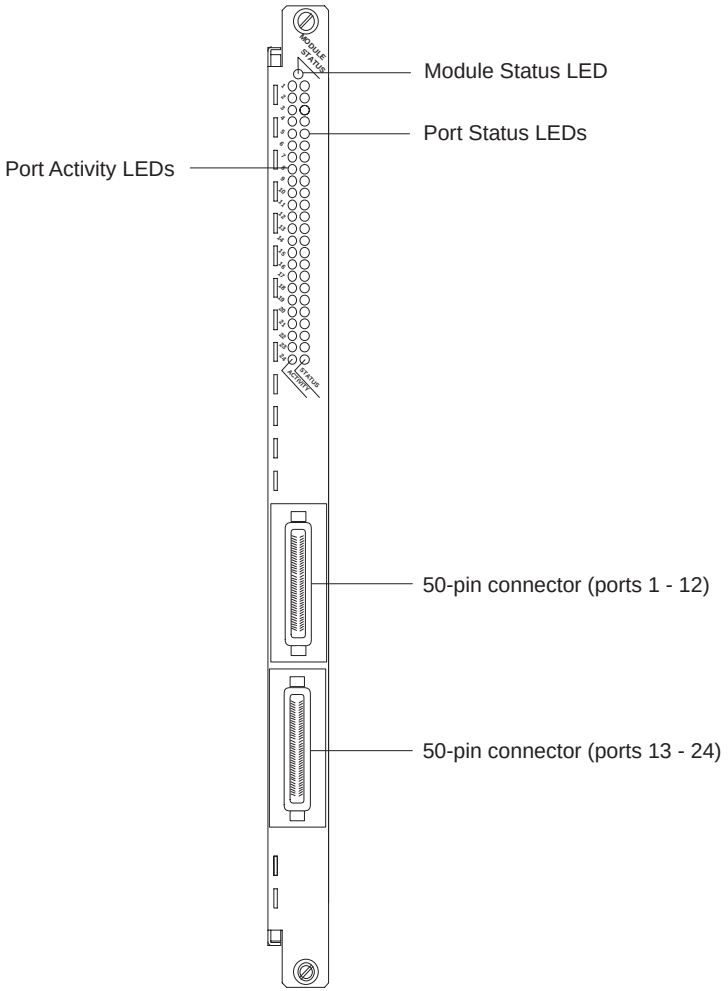


Figure 3-8 24-Port Module Faceplate

Table 3-3 Interpretation of the 24-Port Module LEDs

LED Name	Color	State	Indicates
Module Status	green	Off	No power.
		Blinking	Module failed self diagnostics.
		On	Module powered up OK.
Activity (Ports 1-24)	yellow	Off	No packets are received on the ports.
		On	Constant activity on port.
		Blinking	Normal activity on the port.
Status (Ports 1-24)	green	On	Port enabled and links OK or Link Integrity disabled.
		1 blink	Link failure on the port.
		2 blinks	Port partitioned.
		Off	Port disabled.

LED and Network Verification

This section provides information on LED and Network verification information for the 24-Port module. The following topics are discussed:

- Using the CoreBuilder 5000 Controller Module to Verify LED Operation
- Using the DMM to Verify Network Connections

For more information on the DMM, refer to the *Distributed Management Module User Guide*.

Using the CoreBuilder 5000 Controller Module to Verify LED Operation

The CoreBuilder 5000 hub's controller module is equipped with an LED Test button on the front panel. The LED Test button is used to verify LED operation. When you press this button, the module initiates a test to all modules in the hub. All LEDs should respond by lighting continuously for approximately five seconds. Any LED that does not light is defective. This test will not disrupt network operation.

Using the DMM to Verify Network Connections

The DMM enables you to verify each network connection – both active and isolated – for all CoreBuilder 5000 modules and monitor cards installed in your hub. To initiate the verification process, you must press the Display Control Toggle button on the front of the module. Once you press this button, the DMM sequentially cycles through each network connection (Ethernet 1-8 or Isolated 1-8) and lights each status LED associated with the network indicated on the DMM LCD display. If you attach an Ethernet network monitor card to a network, the Module Status LED lights. The following example illustrates this process.

Verifying Network Connections for the 24-Port Module

Administrator Jim Johnson needs to verify network connections for his newly installed 24-Port module. Currently, Johnson has one 24-Port module connected to Ethernet Networks 1 and 3 (E1 and E3). To verify this configuration, Johnson presses the Display Control Toggle button located on the front of his DMM. Once initiated, the DMM cycles through each network connection (E1 and E3) and performs the following:

- displays the current network under examination (as shown on the DMM LCD display)
- lights the status LEDs associated with the current network

Since Johnson's 24-Port module is connected only to E1 and E3, the network verification will only light those status LEDs associated with those networks. Conversely, if Johnson had configured the 24-Port module with connections to all eight backplane networks, the network verification process would cycle through all eight networks.

Where To Go From Here

Once you complete Chapter 3, proceed to Chapter 4. Chapter 4 provides detailed information on troubleshooting and technical assistance. If you have problems installing your 24-Port module, you should refer to these chapters prior to contacting customer support.

4 TROUBLESHOOTING

This chapter describes troubleshooting procedures for the CoreBuilder™ 5000 Ethernet 24-Port Module. Information on troubleshooting will assist you in verifying the module's operation. Typical fault conditions are addressed in this chapter.

Troubleshooting

Diagnostic features are covered in Table 3-3. Tables 4-1, 4-2, and 4-3 in this chapter cover fault conditions and troubleshooting suggestions for the module. This chapter is divided into the following parts:

- Troubleshooting With the Module Status LED
- Troubleshooting With the Status LEDs
- Troubleshooting With the Activity LEDs
- Technical Assistance

Troubleshooting With the Module Status LED

In certain situations, the module status LED may not light. Table 4-1 outlines both the possible reasons for this problem and some probable solutions.

Table 4-1 Troubleshooting with the Module Status LED

LED State	Possible Problem	Troubleshooting Solutions
Off	Hub power is off	Check the controller module power LEDs.
	The 24-Port module is faulty	Try a different 24-Port module.
	The hub does not have enough available power for a new module installation.	Use the SHOW POWER BUDGET management command to ascertain available power in the hub. (See the *Distributed Management Module Commands Guide* for details.)

Troubleshooting With the Status LEDs

A blinking Port Status indicator signals a problem with a port or a link connected to a port. Once a port detects a problem, you can further analyze the problem by counting the number of blinks. Table 4-2 provides troubleshooting suggestions for each of the blinking sequences.

Table 4-2 Troubleshooting With the Status LEDs

LED State	Indication	Possible Problem	Troubleshooting Suggestions
1 Blink	Link Failure	Cable(s) not connected.	Connect cable(s).
		Cable(s) broken.	Check cables with cable tester. Repair or replace cables.
		Link Integrity mismatch.	Make sure that both ends of the connection have the same Link Integrity setting.
2 Blinks	Port Partitioned	Faulty cable.	Check cable with cable tester. Repair or replace cable.
		Looped cable.	Check the cable and replace if necessary.
Off	Ports Disabled	Ports disabled.	Enable ports.
		24-Port module not powered.	Check the controller module Power LEDs.
		Broken LED.	Press the LED test on the controller module.
		Bad 24-Port module.	Replace module.

Troubleshooting With the Activity LEDs

Under some conditions a port's Activity LED may not light. Use the troubleshooting suggestions in Table 4-3 to help determine why this has occurred and to isolate the source of the problem.

Table 4-3 Troubleshooting With the Activity LEDs

LED State	Possible Problem	Troubleshooting Solutions
Off	There is no traffic received from the segments (normal).	None.
	The Activity LED has burned out.	Press the LED test button on the controller module.
	A 24-Port module port is faulty.	Connect the cable to a different port.
	The module connection to the backplane is bad.	Reinsert the 24-Port module. If this fails to correct the problem, try another hub slot.

Technical Assistance

You can receive assistance for installing and troubleshooting the 24-Port module by calling your 3Com rep or 3Com Technical Support. Be prepared to supply the following information:

- a description of the problem
- the steps you have taken to try to correct the problem
- status of the front panel LEDs
- the version of network management in use
- hardware and software version of the 24-Port module
- the configuration of your network
- the configuration of your hub (you may find it helpful to refer to the Slot Usage Chart that is shipped with the *CoreBuilder 5000 Integrated System Hub Installation and Operation Guide* for a record of this information.)

Refer to Appendix B for instructions on contacting Technical Support for your product.

Where To Go From Here

If you complete this chapter and are still unable to ascertain the cause of a particular problem with your 24-Port module, contact 3Com Customer Support and provide them with the specific nature of your problem. Refer to Appendix B for instructions on contacting Technical Support for your product.

SPECIFICATIONS

This appendix lists specifications for the 24-Port module. Also included in this appendix is information on 50-pin Telco and twisted pair cables and connectors. There are six subsections:

- Electrical Specifications
- Environmental Specifications
- Mechanical Specifications
- General Specifications
- 50-Pin Connector and Cable
- Twisted Pair Connectors and Cables

Electrical Specifications

Backplane Interface: Two 96-pin edge connectors, compatible with 3Com's CoreBuilder 5000 hub

Power Requirements: 3.5 A for 5V

Fuse: 10.0 Amps Fast blow

Watts: +5V = 17 Watts; +12V = .102 Watts; -5V = .108 Watts; +2V = .008 Watts

Environmental Specifications

Operating Temperature: 0° to 50° C (32° to 122° F)

Storage Temperature: -30° to 65° C (-22° to 149° F)

Humidity: less than 95%, non-condensing

BTU/hr: 61

Mechanical Specifications

Dimensions: 1.0" W x 10.275" L x 14.37" H

Weight: 2.4 lbs

General Specifications

Data rate: 10 Mbps (million bits per second)

Data modulation: Manchester

Diagnostic modulation: Link Integrity pulse

Collision detection: 100% deterministic

Port partitioning: after a user-selectable number of consecutive collisions

Maximum number of nodes: 1024

Configuration rules: supports IEEE 802.3 controllers and IEEE 802.3 repeaters

Ethernet interface: Two 50-pin Telco connectors; each supports 12 connections

Number of ports: 24

Cabling: per the 10BASE-T Standard

Host interface: 3Com CoreBuilder 5000 hub bus interface standard

Installation attachment: Two thumbscrews on the faceplate

50-Pin Connector and Cable

Figure A-1 provides examples of a 50-pin cable (male) connector, and a 50-pin (female) connector on the 24-Port module. Following Figure A-1 is Table A-1 which lists the receive and transmit pairs, pinouts, and port assignments for a 50-pin cable.

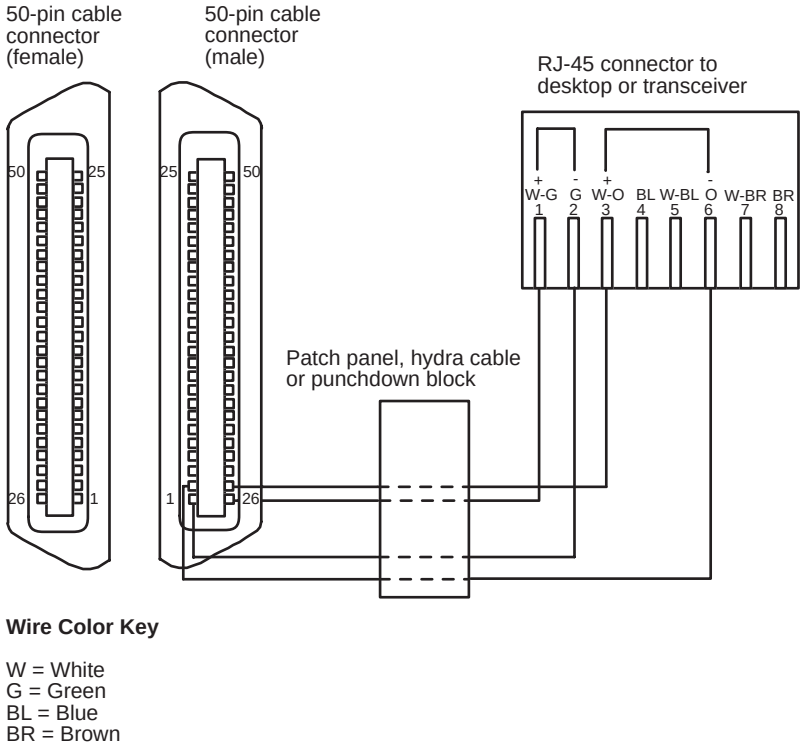


Figure A-1 50-Pin Cable Male and Female Connectors

Table A-1 50-Pin Cable Pinouts and Port Assignments

Hub Port #	Hub Pin #	Hub Function/ Polarity	Transceiver Function /Polarity	Hub Port #	Hub Pin #	Hub Function/ Polarity	Transceiver Function /Polarity
Port 1	26	RX, +	TX, + (1)	7	38	RX, +	TX, + (1)
Port 1	1	RX, -	TX, - (2)	7	13	RX, -	TX, - (2)
Port 1	27	TX, +	RX, + (3)	7	39	TX, +	RX, + (3)
Port 1	2	TX, -	RX, - (6)	7	14	TX, -	RX, - (6)
Port 2	28	RX, +	TX, + (1)	8	40	RX, +	TX, + (1)
Port 2	3	RX, -	TX, - (2)	8	15	RX, -	TX, - (2)
Port 2	29	TX, +	RX, + (3)	8	41	TX, +	RX, + (3)
Port 2	4	TX, -	RX, - (6)	8	16	TX, -	RX, - (6)
Port 3	30	RX, +	TX, + (1)	9	42	RX, +	TX, + (1)
Port 3	5	RX, -	TX, - (2)	9	17	RX, -	TX, - (2)
Port 3	31	TX, +	RX, + (3)	9	43	TX, +	RX, + (3)
Port 3	6	TX, -	RX, - (6)	9	18	TX, -	RX, - (6)
Port 4	32	RX, +	TX, + (1)	10	44	RX, +	TX, + (1)
Port 4	7	RX, -	TX, - (2)	10	19	RX, -	TX, - (2)
Port 4	33	TX, +	RX, + (3)	10	45	TX, +	RX, + (3)
Port 4	8	TX, -	RX, - (6)	10	20	TX, -	RX, - (6)
Port 5	34	RX, +	TX, + (1)	11	46	RX, +	TX, + (1)
Port 5	9	RX, -	TX, - (2)	11	21	RX, -	TX, - (2)
Port 5	35	TX, +	RX, + (3)	11	47	TX, +	RX, + (3)
Port 5	10	TX, -	RX, - (6)	Port 11	22	TX, -	RX, - (6)
Port 6	36	RX, +	TX, + (1)	Port 12	48	RX, +	TX, + (1)
Port 6	11	RX, -	TX, - (2)	Port 12	23	RX, -	TX, - (2)
Port 6	37	TX, +	RX, + (3)	Port 12	49	TX, +	RX, + (3)
Port 6	12	TX, -	RX, - (6)	Port 12	24	TX, -	RX, - (6)
					50	Not Used	Not Used
					25	Not Used	Not Used

Twisted Pair Connectors and Cables

There are many types of cables and connectors that you can use to link your 24-Port module to your network. Use this information in this section to ensure that the cables and connecting hardware meet requirements. For proper operation, use only approved cables when you install all equipment. This section is divided into the following parts:

- Twisted Pair Connectors
- Twisted Pair Cables

Twisted Pair Connectors

The IEEE 802.3 10BASE-T standard for RJ-45 pinouts must be used, as described below. 10BASE-T uses 2 of the 4 pairs of wire: pins 1 & 2 and pins 3 & 6. If the pairs are not configured this way, the connection will not work properly. Level 3 or higher cable should have the following pin pairings:

- pins 4 and 5 are pair 1
- pins 3 and 6 are pair 2
- pins 1 and 2 are pair 3
- pins 7 and 8 are pair 4

Refer to Figure A-2 for an example of the recommended TIA-568A standard pinouts for this connector and the cable.

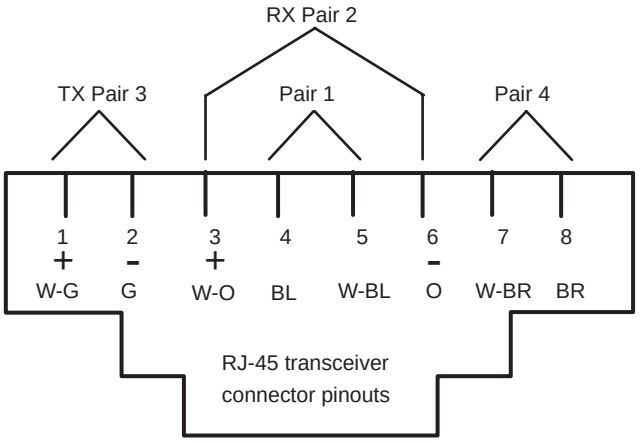


Figure A-2 RJ-45 Connector Pinouts

Twisted Pair Cables

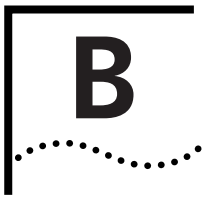
The cables that are supported must meet the following qualifications:

- Level 3 or higher
- 22 or 24 gauge twisted pair cable
- 85 to 115 ohm impedance
- minimum of 2 pairs

A *pair* is usually a solid color wire twisted with a striped wire of the same color.

Connecting Twisted Pair Cables

We recommend that you connect cables first at the active hub location, and connect transceivers second. Refer to the *CoreBuilder 5000 Integrated System Hub Installation and Operation Guide* for more information about the CoreBuilder 5000 hub connections.



TECHNICAL SUPPORT

3Com provides access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the very latest, access 3Com Corporation's World Wide Web site as described below.

This appendix describes:

- Online Technical Services
- Support From Your Network Supplier
- Support From 3Com Corporation
- Returning Products for Repair
- Accessing the 3Com MIB
- Contacting 3Com Technical Publications

Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web Site
- 3Com Bulletin Board Service
- 3ComFacts Automated Fax Service
- 3ComForum on CompuServe Online Service

World Wide Web Site

Access the latest networking information on 3Com Corporation's World Wide Web site by entering our URL into your Internet browser:

http://www.3Com.com/

This service features news and information about 3Com products, customer service and support, 3Com Corporation's latest news releases, *NetAge* Magazine, and more.

3Com Bulletin Board Service

3ComBBS contains patches, software, and drivers for all 3Com products, as well as technical articles. This service is available through modem or ISDN 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	up to 14400 bps	61 2 9955 2073
Brazil	up to 14400 bps	55 11 547 9666
France	up to 14400 bps	33 1 6986 6954
Germany	up to 28800 bps	4989 62732 188
Hong Kong	up to 14400 bps	852 2537 5608
Italy (fee required)	up to 14400 bps	39 2 27300680
Japan	up to 14400 bps	81 3 3345 7266
Mexico	up to 28800 bps	52 5 520 7853
P. R. of China	up to 14400 bps	86 10 684 92351
Singapore	up to 14400 bps	65 534 5693
Taiwan	up to 14400 bps	886 2 377 5840
U.K.	up to 28800 bps	44 1442 438278
U.S.A.	up to 28800 bps	1 408 980 8204

Access by Digital Modem

ISDN users can call 3ComBBS using a digital modem for fast access up to 56 Kbps. To access 3ComBBS using ISDN, use the following number:

408 654 2703

3ComFacts Automated Fax Service

3Com Corporation's interactive fax service, 3ComFacts℠, provides data sheets, technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3ComFacts using your Touch-Tone telephone using one of these international access numbers:

Country	Telephone Number
Hong Kong	852 2537 5610
U.K.	44 1442 278279
U.S.A.	1 408 727 7021

Local access numbers are available within the following countries:

Country	Telephone Number
Australia	1 800 123853
Belgium	0800 71279
Denmark	800 17319
Finland	98 001 4444
France	05 90 81 58
Germany	0130 81 80 63
Italy	1678 99085

Country	Telephone Number
Netherlands	06 0228049
Norway	800 11062
Portugal	0505 442 607
Russia (Moscow only)	956 0815
Spain	900 964 445
Sweden	020 792954
U.K.	0800 626403

3ComForum on CompuServe Online Service

3ComForum is a CompuServe-based service containing patches, software, drivers, and technical articles about 3Com products, as well as a messaging section for peer support. To use 3ComForum, you need a CompuServe® account.

To use 3ComForum:

1. Log on to CompuServe.
2. Type **`go threecom`**
3. Press Return to view the 3ComForum main menu.

Support From Your Network Supplier

If additional assistance is required, contact your network supplier. Several suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

If you contact your network supplier for assistance, have the following information ready:

- Diagnostic error messages
- A list of system hardware and software, including revision levels
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, refer to the following section on how to contact 3Com.

Support From 3Com Corporation

If you are unable to receive support from your network supplier, technical support contracts are available from 3Com.

Contact your local 3Com sales office to locate your authorized service provider using one of the following numbers:

Regional Sales Office	Telephone Number
3Com Corporation	
U.S.A.	800 NET 3Com *or* 1 408 764 5000
3Com ANZA	
East	61 2 9937 5000
West	61 3 9866 8022
3Com Asia Limited	
China	86 10 68492 568 (Beijing) 86 21 6374 0220 Ext 6115 (Shanghai)
Hong Kong	852 2501 1111
India	91 11 644 3974
Indonesia	62 21 523 9181
Korea	82 2 319 4711
Malaysia	60 3 732 7910
Singapore	65 538 9368
Taiwan	886 2 377 5850
Thailand	662 231 8151 4
3Com Benelux B.V.	
Belgium	32 725 0202
Netherlands	31 30 6029700
3Com Canada	
Calgary	403 265 3266
Montreal	514 683 3266
Ottawa	613 566 7055
Toronto	416 498 3266
Vancouver	604 434 3266
3Com France	33 1 69 86 68 00
3Com GmbH	
Austria	43 1 5134323
Czech and Slovak Republics	42 2 21845 800
Germany	49 30 3498790 (Berlin) 49 89 627320 (Munich)
Hungary	36 1 250 83 41
Poland	48 22 6451351
Switzerland	41 31 996 14 14

Regional Sales Office	Telephone Number
3Com Ireland	353 1 820 7077
3Com Japan	81 3 3345 7251
3Com Latin America	
Argentina	54 1 312 3266
Brazil	55 11 546 0869
Chile	56 2 633 9242
Colombia	57 1 629 4110
Mexico	52 5 520 7841
Peru	51 1 221 5399
Venezuela	58 2 953 8122
3Com Mediterraneo	
Italy	39 2 253011 (Milan) 39 6 5279941 (Rome)
3Com Middle East	971 4 349049
3Com Nordic AB	
Denmark	45 39 27 85 00
Finland	358 0 435 420 67
Norway	47 22 18 40 03
Sweden	46 8 632 56 00
3Com Russia	007 095 2580940
3Com South Africa	27 11 807 4397
3Com UK Limited	44 131 2478558 (Edinburgh) 44 161 8737717 (Manchester) 44 1628 897000 (Marlow)

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain a Return Materials Authorization (RMA) number. Products sent to 3Com without RMA numbers are returned to the sender unopened, at the sender's expense.

To obtain an RMA number, call or fax:

Country	Telephone Number	Fax Number
U.S.A. and Canada	1 800 876 3266, option 2	408 764 7120
Latin America	1 408 326 7801	408 764 7120
Europe, South Africa and Middle East	44 1442 438125	44 1442 435822
Outside Europe, U.S.A., and Canada	1 408 326 7804	1 408 764 7120

Accessing the 3Com MIB

The 3Com Management Information Base (MIB) describes commands that enable you to manage 3Com SNMP-based products. The MIB is available over the Internet on an anonymous FTP server. Updates to these MIBs are released as new 3Com products are introduced.

To access Internet versions:

1. FTP to **`ftp.3com.com`** (151.104.9.65).
2. Enter the login name `anonymous`.
3. Enter your full Internet e-mail address as the password (for example, **`jdoe@company.com`**).
4. Change to the /pub/mibs directory using the command **`cd/pub/mibs`**.
5. Read the readisd.txt file to determine the MIB or MIBs you need to manage your 3Com products.
6. To view the 3Com MIB, OID, or schema entries, enter the **`ls`** command.
   - To pause the display, press Ctrl+S.
   - To continue the display, press Ctrl+Q.
7. Copy the MIB, OID, or schema files to your current directory using the appropriate command (for example, **`get isd.mib`**).
8. Exit the FTP session using the **`quit`** command.

Contacting 3Com Technical Publications

If you have comments or questions on 3Com Technical Publications documents, contact the Technical Publications group by fax at (508) 229-1551.

02/06/97

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